What is claimed is:

1. An electrostatic comb drive comprising

a base;

a movable element movably connected to the base and configured to move from a first position to a second position relative to the base;

a spring disposed between the base and the movable element and configured to provide a potential energy maximum between the first position and the second position;

a fixed finger attached to the base, the fixed finger having a first portion proximate to the base and disposed between the base and a second portion of the fixed finger; and

a movable finger attached to the movable element, the movable finger having a third portion proximate to the movable element and disposed between the movable element and a fourth portion of the movable finger, a first capacitance arising between the fixed finger and the movable finger when the second portion is adjacent to the fourth portion and a second capacitance arising between the fixed finger and the movable finger when the second portion is adjacent to the third portion, the first capacitance being greater than the second capacitance.

2. The electrostatic comb drive of claim 1 wherein the second portion is wider than the first portion and the fourth portion is wider than the third portion.

3. The electrostatic comb drive of claim 1 wherein the second portion is at least three times as wide as the first portion.

4. The electrostatic comb drive of claim 1 wherein the first portion is less than four microns wide and the second portion is greater than six microns wide.

5. The electrostatic comb drive of claim 1 wherein the second portion is taller than the first portion and the fourth portion is taller than the third portion.

6. The electrostatic comb drive of claim 1 wherein the second portion is at least three times as tall as the first portion.

7. The electrostatic comb drive of claim 1 further comprising a mechanical latch to latch the movable element in one of the first position and the second position.

8. The electrostatic comb drive of claim 1 wherein the mechanical latch is combined with the spring to form a latching spring arm.

9. The electrostatic comb drive of claim 1 further comprising:

a second movable finger attached to the movable element and extending away from the movable element in a direction opposite to the movable finger; and

a second fixed finger proximate to the second movable finger and extending from the base toward the movable element, wherein the second movable finger is electrically coupled to the movable finger and the second fixed finger is electrically coupled to the fixed finger.

10. The electrostatic comb drive of claim 1 further comprising a voltage supply electrically coupled to the fixed finger with a first electrical connection and electrically coupled to the movable finger with a second electrical connection, the voltage supply configured to provide a first voltage pulse to toggle the movable element from the first position to the second position and to provide a second voltage pulse to toggle the movable element from the second position to the first position wherein the first voltage pulse and the second voltage pulse are essentially the same.

11. An electrostatic comb drive comprising:

a base;

a movable element movably connected to the base and configured to move from a first position to a second position relative to the base;

a fixed finger attached to the base, the fixed finger having a first narrow portion proximate to the base and a first wide portion distal from the base; and

a movable finger attached to the movable element, the movable finger having a second narrow portion proximate to the movable portion and a second wide portion distal from the movable element.

12. The electrostatic comb drive of claim 11 further comprising a latching spring arm.

13. The electrostatic comb drive of claim 11 further comprising an overlap portion extending away from the first wide portion toward the movable element, the overlap portion being at least partially adjacent to the second wide portion in one of the first position and the second position.

14. The electrostatic comb drive of claim 11 further comprising an overlap portion extending away from the second wide portion toward the base, the overlap portion being at least partially adjacent to the first wide portion in one of the first position and the second position.

15. The electrostatic comb drive of claim 11 wherein a center portion of the second wide portion has been removed.

16. An electrostatic comb drive comprising:

a base;

a movable element;

a first latching spring arm movably connecting the movable element to the base;

a second latching spring arm movably connecting the movable element to the base, the first latching spring arm and the second latching spring providing a first potential energy minimum at a first stable position of the movable element relative to the base and providing a second potential energy minimum at a second stable position of the movable element relative to the base, and providing a potential energy maximum between the first stable position and the second stable position;

a fixed finger attached to the base, the fixed finger having a first narrow portion proximate to the base and a first wide portion distal from the base, the first wide portion being at least twice as wide as the first narrow portion; and

a movable finger attached to the movable element, the movable finger having a second narrow portion proximate to the movable portion and a second wide portion distal from the movable element, the second wide portion being at least twice as wide as the first narrow portion.

17. A method of fabricating an electrostatic comb drive, the method comprising:

providing a wafer having

a superstrate,

a substrate, and

a bonding layer bonding the superstrate to the substrate,

masking a set of fixed fingers in the superstrate, a fixed finger having a first narrow portion proximate to a base of the electrostatic comb drive and a first wide portion extending from the first narrow portion away from the base;

masking a set of movable fingers in the superstrate, a movable finger having a second narrow portion proximate to a movable element of the electrostatic comb drive and a second wide portion extending from the second narrow portion away from the movable element toward the base; and

removing the bonding layer from beneath at least the movable element and the set of movable fingers.

18. A device made according to the method of claim 17.

19. An electrostatic comb drive comprising:

a base;

a movable element;

a fixed finger attached to the base, the fixed finger having a first short portion proximate to the base and a first tall portion distal from the base; and

a movable finger attached to the movable element, the movable finger having a second short portion proximate to the movable portion and a second tall portion distal from the movable element.

20. The electrostatic comb drive of claim 19 wherein a portion of the first tall portion is adjacent to the second tall portion when the movable element is in a first stable position.

21. The electrostatic comb drive of claim 19 wherein the first tall portion is at least three times as high as the first short portion and the second tall portion is at least twice as high as the second short portion.

22. A method of fabricating an electrostatic comb drive, the method comprising:

providing a wafer having

a superstrate,

a substrate, and

a bonding layer bonding the superstrate to the substrate,

exposing a first etch region of the wafer;

etching the superstrate to a selected thickness in the first etch region;

masking a comb finger area of the wafer, the comb finger area including at least a portion of the first etch region;

etching through the superstrate to define a comb finger having a first thickness in the first etch region and a second thickness in a thick region, the first thickness being less than the second thickness.

23. The method of claim 22 further comprising a step, after etching through the superstrate, of

removing the bonding layer from beneath at least the comb finger area.

24. The method of claim 22 wherein the exposing step occurs subsequent to the masking step.

25. A method of operating an electrostatic comb drive having a first stable position and a second stable position, the method comprising:

from the first stable position, applying an actuating pulse to accelerate a movable element of the electrostatic comb drive toward the second stable position;

displacing the movable element beyond a potential energy maximum between the first stable position and the second stable position while

maintaining the actuating pulse to decelerate the movable element;

removing the actuating pulse; and

latching the movable element in the second stable position.

26. The method of claim 25 wherein the actuating pulse does not exceed 40 volts.

27. The method of claim 25 wherein the actuating pulse is a square voltage pulse.

28. The method of claim 25 further comprising steps, after the latching step, of:

applying a second actuating pulse to accelerate the movable element toward the first stable position;

displacing the movable element beyond the potential energy maximum;

maintaining the actuating pulse to decelerate the movable element, wherein the second actuating pulse is substantially identical to the actuating pulse;

removing the second actuating pulse; and

latching the movable element in the first stable position.

29. The method of claim 28 wherein the first actuating pulse is a square wave pulse.

30. A method of initializing an electrostatic comb drive having a first stable position and a second stable position, the method comprising:

applying a voltage between a set of movable fingers and a set of fixed fingers;

maintaining the voltage to draw a movable element of the electrostatic comb drive from one of the first stable position and the second stable position to a position between a potential energy maximum and the first stable position;

releasing the voltage so that the movable element moves to the first stable position.

31. A method of designing an actuation pulse for a micro-electro-mechanical system ("MEMS") device, the method comprising:

determining a first actuation window in a time-voltage plane, the first actuation window corresponding to first limits in pulse duration and applied voltage for switching a movable element of the MEMS device from a first position to a second position for the movable element fabricated with a first critical dimension limit from a base of the MEMS device;

determining a second actuation window in the time-voltage plane, the second actuation window corresponding to second limits in pulse duration and applied voltage for switching the movable element of the MEMS device from the first position to the second position for the movable element fabricated with a second critical dimension limit from the base of the MEMS device;

overlying the first actuation window and the second actuation window to result in a common actuation window; and

selecting an actuation pulse from within the common actuation window.